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THE ITALIAN CONTRIBUTION TO THE DEVELOPMENT OF THE PULP AND PAPER INDUSTRY IN CERTAIN COUNTRIES UNDER INDUSTRIAL DEVELOPMENT

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THE ITALIAN CONTRIBUTION TO THE DEVELOPMENT OF PULP AND PAPER INDUSTRY IN CERTAIN COUNTRIES UNDER INDUSTRIAL DEVELOPMENT

By Ing. Giuseppe VIOLA

I - It is well known that the demand of pulp and paper has been growing in the world with a continuous, increasing trend, in tight connection with the industrial development and consequent improvement of the standard of living: this phenomenon is more remarkable in the "new countries", where the effort for a general industrialization is particularly deep. The world paper demand for the next years has been evaluated, and the prospects can be summarized as follows:

Region	Paper			Board			Total paper and board		
	1955	1965	1975	1955	1965	1975	1955	1965	1975
1. North America	18,599	24,470	32,390	12,923	18,315	26,220	31,522	42,785	58,610
2. Latin America	1,469	2,780	5,125	353	700	1,405	1,822	3,480	6,525
3. W. Europe	9,881	15,705	21,620	3,272	5,595	8,585	13,153	21,300	30,215
4. E. Europe	1,355	2,705	4,615	535	1,240	2,440	1,890	3,945	7,055
5. U.S.S.R.	1,900	4,460	8,590	575	1,650	3,755	2,475	6,115	12,345
6. Africa	415	755	1,340	71	140	265	486	890	1,605
7. Near and Middle East	107	210	390	32	65	135	139	275	525
8. Far East	2,226	4,835	9,165	766	2,045	4,670	2,992	6,880	13,835
9. China (Mainland)	698	2,405	6,645	170	680	2,180	868	3,085	8,830
10. Oceania	578	905	1,245	182	360	590	760	1,265	1,835
World total	37,220	59,230	91,130	18,870	30,790	50,250	56,090	90,020	141,380

These prospects have, as a consequence, posed the problem of the sources of suitable raw-materials for the production of pulp and paper to fulfill the increasing demand economically. The traditional areas, where the pulp and paper industry was practically born and had its prevailing development, are those concentrated between 40th and 65th parallel in the Northern Emisphere: spruce and pine have been, for many years, the basic raw materials for the paper industries: however, between the two world wars, and especially after the second world war, other raw materials have been taken into consideration, and good industrial results have been obtained. The progress in the technique and technology of the pulp and paper industry, the development of new processes have

broadened the field of choice of the raw materials: besides the hardwoods, which pulping has entered now into the industrial practice, also annual crops and agricultural residues have been used, and their utilization has now become quite usual.

In Italy, a country with very reduced forestal resources, the employ of cereal straw for the production of low grade wrapping paper has been always practiced, but in the last 40 years, new processes have been developed for the production of bleached pulp from straw, to be employed up to high percentages in various quality papers. For instance, the soda-chlorine process, which is now considered a classical one for pulping this kind of raw material, was born and has been developed in Italy. This process has been applied in many countries and in the last 30 years the possibility of basing the paper industry also on straw has been experimented in South America, Africa, Asia. A raw material having properties similar to straws, but presenting even more favourable conditions for the pulp industry, is the sugar-cane bagasse. It practically grows between 30° North, and 30° South, i.e. in all tropical and sub-tropical areas: it is the part of the world, where most of the countries under industrial development lie, and certainly the possibility of utilizing this material, which at present is burned in the sugar mill furnaces, is a very promising opportunity.

It is to be remarked that, when considering the various factors for establishing new industries, the possibility of using indigenous raw-material is of the greatest importance: the shortage of foreign currencies is to be considered as normal and unavoidable when a Country is producing its biggest effort to develop its industrial organization, and consequently any way to reduce the importation of products which can be produced locally, is to be considered as a favourable condition. Furthermore, the local production helps the increase of consumption probably at an higher rate than in the case the product should be imported.

For these general reasons, the various States, the International Authorities, the industrial groups, during the last years have devoted a continuously increasing attention to the problem of utilization of straws, grasses, bagasse.

II - The various processes available

Various are the processes available for the pulping of raw materials like agricultural residues, grasses, etc. The most important are compendiously described below:

The Conventional Soda Process

This process is used for the production of bleached pulp and in some mills for the production of high quality board. The cooking is performed in rotary globe digesters or tumbling type pressure digesters, employing high chemical concentration (up to 20%) at high temperature

(170°C). The cooking time is about 2÷3 hours and the complete Cooking cycle is 5 hours. The yield is rather low in comparison with the other processes and also the characteristics of the obtained pulp are affected by the drastic action of the high chemical concentration at elevated temperature.

The soda process requires a high initial investment, necessary for the pressure digesters and for the auxiliary equipment.

Whereas possible, in the recent years, this process has been modified in the sulfate process.

The Sulfate process

This process has been developed in the past thirty years and has almost replaced the soda process for the production of alkaline pulp. The process is practically similar to the soda process, except that the loss of soda in the recovery system is made up by the addition of salt cake (sodium sulphate) instead of soda or caustic soda. The cooking liquor contains sodium sulphide, which presence results in a milder action, giving a slightly increased yield of pulp.

The sulphate process, like the soda process, requires a high initial investment, because it is absolutely essential to install a recovery system, in order to reduce the sodium sulphate into sodium sulphide. A disadvantage of this process is the most disagreable odour, due to the organic sulphur compounds formed in the reaction under high pressure.

Notwithstanding many efforts made in the last years, it is to be noted that the chemical recovery system does not work satisfactorily when using raw materials containing high silica content, like for example rice straw. Up to now no satisfactory recovery system seems to have been found in order to overcome this inconvenience.

The monosulphite process

The sodium monosulphite process has become widely used in many countries for the production of straw pulp and bagasse pulp. The principal cooking agent consists of sodium sulphite which is buffered with sodium carbonate, sodium bicarbonate or caustic soda during the cooking operation. Being the sodium sulphite a mild cooking agent, high pressures are required in the digesters.

From a technical point of view, the monosulphite process is one of the most suitable of all the conventional professes in which pressure digesters are used. From the economic point of view, this process may be successfully adopted provided that the monosulphite is obtainable as by-products of the chemical industry. However, in certain countries, where the cost of the chemical, not obtainable as by-product, is very high, the use of this process may prove not feasible at all.

The Soda-Chlorine process

This process is rather widely used all over the world for pulping agricultural residues. In this process a mild caustic soda cook at atmospheric pressure is followed by a chlorination stage and alkaline treatment which continue the extraction process. These stages are followed by a bleaching with hypochlorite.

In the soda chlorine process the products of an electrolytic plant can be used in approximately the ratio in which they come from the cells. This is attractive to countries which have no established chemical industry, but possess plentiful supplies of salt and low cost power.

This process running at atmospheric pressure, requires an initial investment lower than that for the other pressure processes.

The problem of the choice of the more suitable process depends on many factors, among which we would like to mention:

- the local prevailing conditions in respect of raw material availability, cost of chemicals and the final product required;
- the size of the mill to be installed, with particular regard to its initial output, and possible future expansion);
- simplicity of installation, in connection with training of personnel and, more in general, smooth plant operation.

Without entering into many details, the general suggestions to be born in mind are the following ones:

- The type of available local raw material better than the selling marketing conditions, should condition the selection of the grade of product to be obtained. In fact, when a certain raw material is converted into the more appropriate final product by the more suitable industrial process, it is most probable that the production costs are comparatively lower, and the local product can thus compete favourably with imported similar goods. As an example, sugar cane bagasse can be pulped as semi-pulp to give an excellent and economic corrugating medium, or, alternatively, pulped as bleached pulp for high grade writing and printing papers, both final products being in position to compete favourably with the same products obtained from conventional raw materials.

- When determining the size of a new mill, it should be considered that the local production promotes the consumption considerably, and also, in the case the general conditions are favourable, that the marketing area is likely to be broadened by exporting to neighbouring countries.

- When installing a new factory in a country in phase of industrial expansion, a very important factor is to select the simplest process and the most experienced type of equipment: to sum up this general rule in a "slogan", it would be recommended "New processes in old countries, old processes in new countries".

A very important point is finally the "human factor": at the same time when installing a new industry, it is necessary to prepare the required

personnel, by training local people and by preparing "running-in" groups, that could give substancial cooperation to the growing new activity.

II - Two Samples of integrated paper plants, recently realized by the Italian Industry in South East Asia

It is interesting now to examine two recent cases in which the Italian industry has given a substancial cooperation to the establishment of a new factory in countries under industrial development: we mention the Pabrik Kertas Blabak, in Java (Indonesia) and the COGIDO Paper Mill, near Saigon (Viet-Nam).

In both cases, State Authorities (Bank Industri Negara, and Crédit Commercial du Viet-Nam) which had never directly exploited the paper industry, after careful examination of the local raw material availability, of the marketing conditions and of the possible processes available, decided to avail themselves of the cooperation of Italian Industry, which could offer the necessary general guarantees and provide technical and financial help.

The Blabak Pulp and Paper Mill was designed for a production of 7000 tons per year of writing and printing papers; it uses bleached pulp obtained from rice straw and bagasse, by soda-chlorine process. The plant is composed of the following departments:

a) Paper mill consisting of stock preparation, paper machine and finishing room.
b) Pulp plant consisting of straw and bagasse cleaning, cooking, screening and bleaching.
c) Chemical production consisting of electrolytic room producing the required chemicals from salt.
d) Steam and Power plant consisting of boilers and Diesel engines.
e) Auxiliary departments consisting of hydric station, maintenance workshops and laboratory.

The Cogido Pulp and Paper mill designed for a production of 7500 tons per year of writing, printing and wrapping papers; it also uses bleached pulp obtained from rice straw and bagasse by soda-chlorine process. The plant is practically composed of the same departments of Blabak Mill.

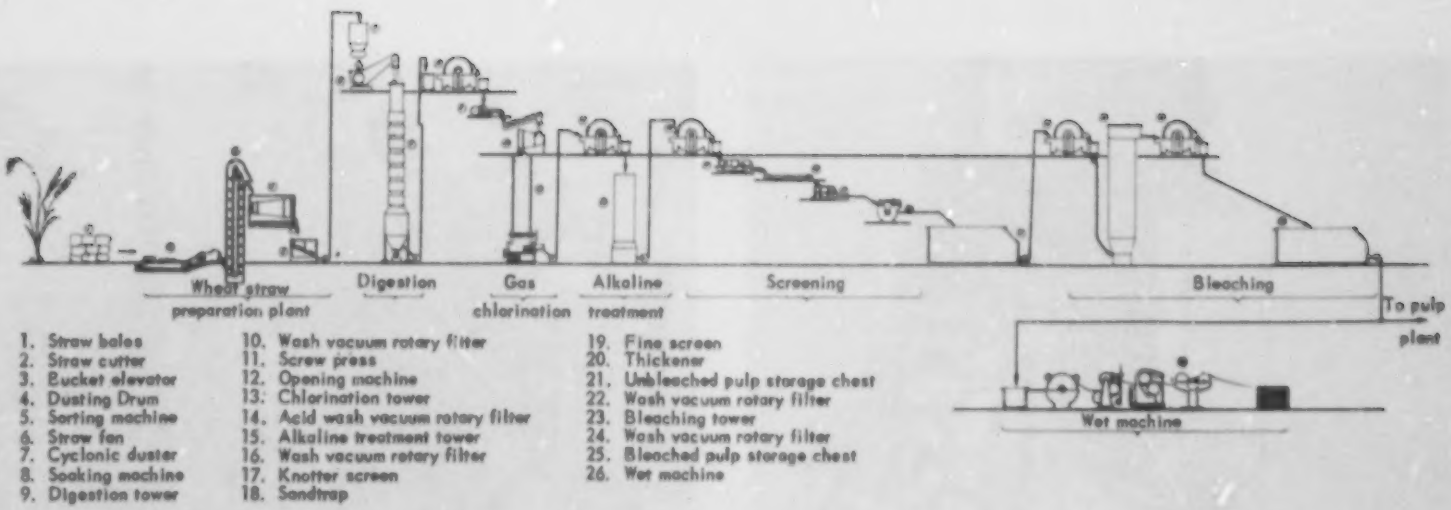
Out of these cases the experience has proved that the cooperation between the new countries promoting the new enterprise can attain the full success, provided that the following points are ensured:

- Full mutual support in the designing and construction work: the success depends mainly on the cooperation of the local forces and organization, because the foreign experts, who will follow the realization on the spot, can ordinarily give only a general supervision on the new enterprise.

- Financial help, by allowing reasonably deferred payment terms for the factory's equipment; a certain participation in the enterprise by the plant supplier is advisable, provided that fair conditions for the investment pay-back and profit transfer are foreseen.

- Technical assistance from the supplier to be prolonged until the local staff and organization proves to be fully acquainted with the problems of the new industry. It is to be considered by the local promoter that this technical advice, the cost of which is only a small percentage of the total investment, is one of the most important item of the investment. In fact on this assistance, which should continue for some years after the starting up of the mill, depends in a great degree the full success of the new industry.

In this way some aspects of the problems involved in the paper industry in new countries have been examined, as well as the Italian contribution to a favourable solution of the same.



1. Straw bales
2. Straw cutter
3. Bucket elevator
4. Dusting Drum
5. Sorting machine
6. Straw fan
7. Cyclonic duster
8. Soaking machine
9. Digestion tower
10. Wash vacuum rotary filter
11. Screw press
12. Opening machine
13. Chlorination tower
14. Acid wash vacuum rotary filter
15. Alkaline treatment tower
16. Wash vacuum rotary filter
17. Knotter screen
18. Sandtrap
19. Fine screen
20. Thickener
21. Unbleached pulp storage chest
22. Wash vacuum rotary filter
23. Bleaching tower
24. Wash vacuum rotary filter
25. Bleached pulp storage chest
26. Wet machine

Fig. 1 - Soda-Chlorine Process

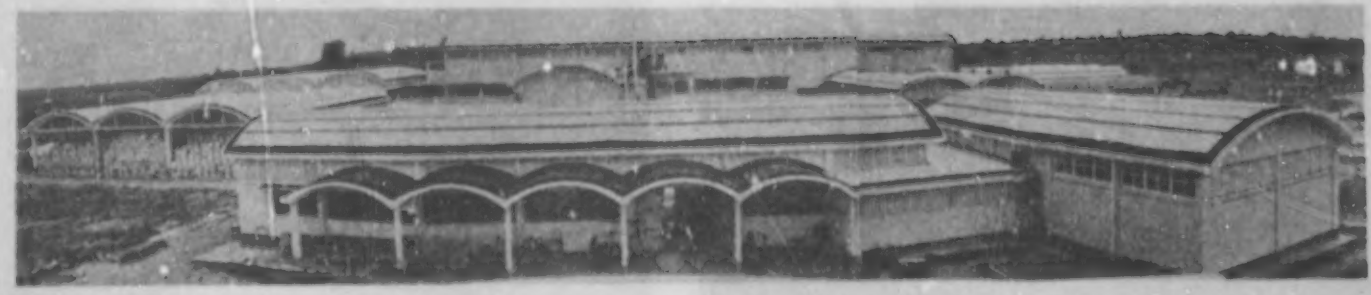
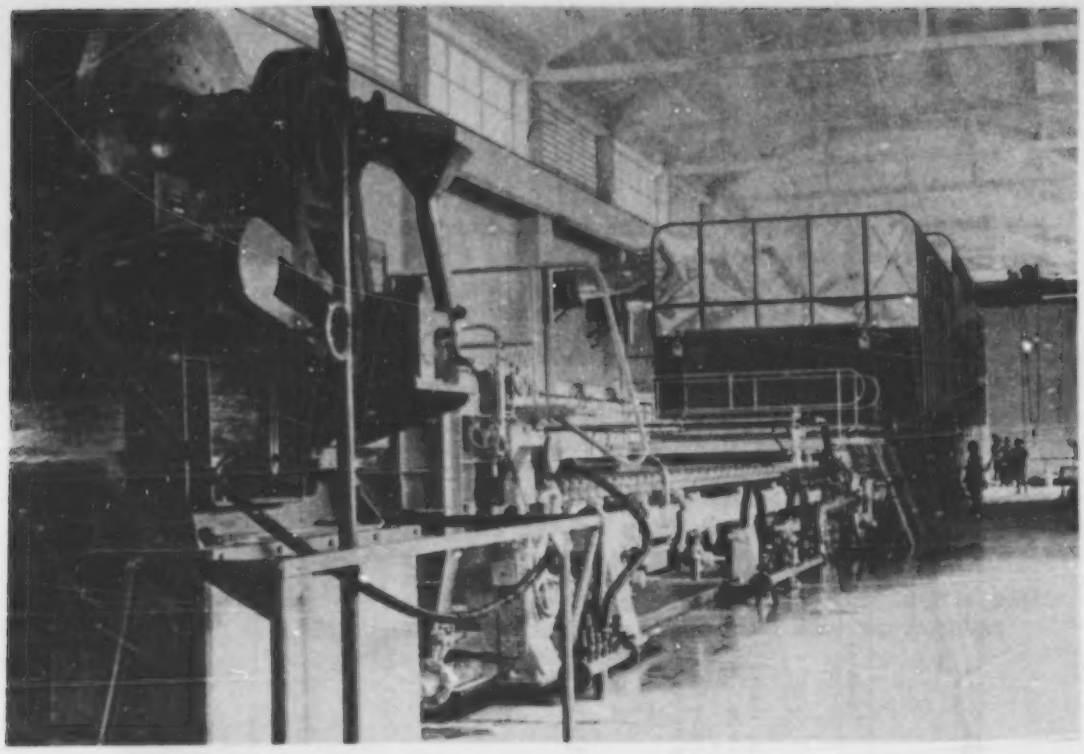
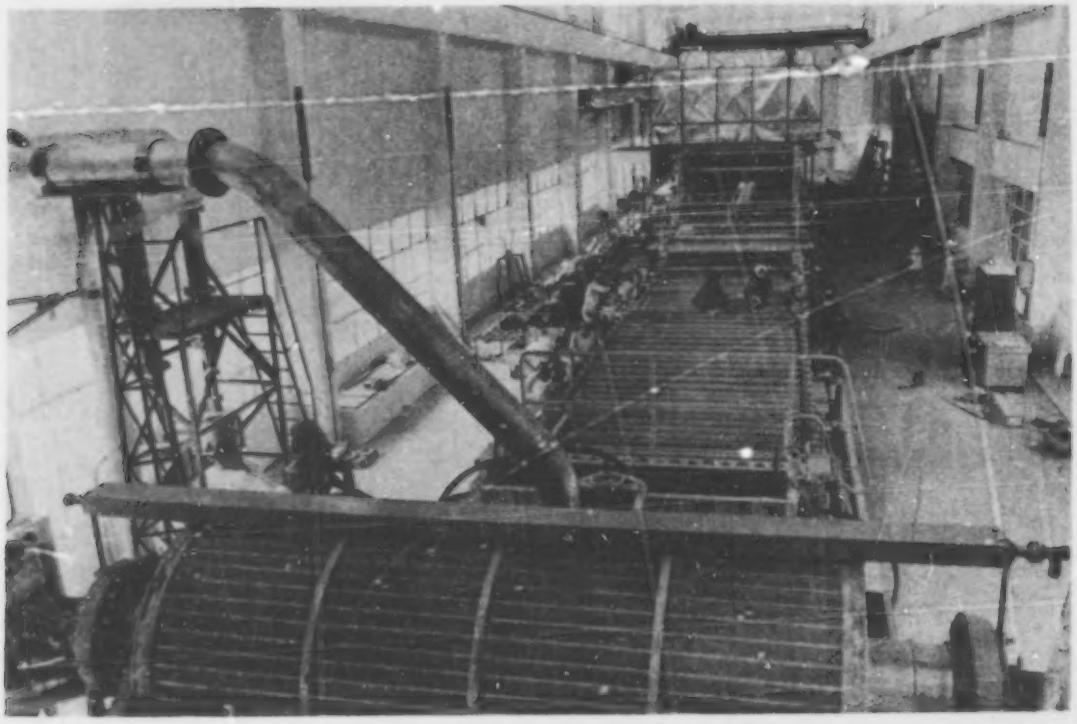


Fig. 2 - COGIDO Pulp and Paper Mill - Viet-Nam





COGIDO Pulp and Paper Mill - Viet-Nam

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